HEWLETT-PACKARD COMPANY
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PATENT APPLICATION

ATTORNEY DOCKET NO. 10992107-1

IN THE
UNITED STATES PATENT AND TRADEMARK OFFICE

Inventor(s): D. Amnon Silverstein

Confirmation No.: 5916

Application No.: 09/597,960

Examiner: M. Said

Filing Date: 6/20/2000

Group Art Unit: 2673

Title: COLLAPSIBLE COMPUTER MOUSE

Mail Stop Appeal Brief-Patents
Commissioner For Patents
PO Box 1450
Alexandria, VA 22313-1450

TRANSMITTAL OF APPEAL BRIEF

Sir:

Transmitted herewith in **triplicate** is the Appeal Brief in this application with respect to the Notice of Appeal filed on 3/10/ 2003.

The fee for filing this Appeal Brief is (37 CFR 1.17(c)) $320.00.

(complete (a) or (b) as applicable)

The proceedings herein are for a patent application and the provisions of 37 CFR 1.136(a) apply.

( ) (a) Applicant petitions for an extension of time under 37 CFR 1.136 (fees: 37 CFR 1.17(a)-(d) for the total number of months checked below:

( )	one month	$110.00
( )	two months	$410.00
( )	three months	$930.00
( )	four months	$1450.00

( ) The extension fee has already been filled in this application.

(X) (b) Applicant believes that no extension of term is required. However, this conditional petition is being made to provide for the possibility that applicant has inadvertently overlooked the need for a petition and fee for extension of time.

Please charge to Deposit Account **08-2025** the sum of $320.00. At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account 08-2025 pursuant to 37 CFR 1.25. Additionally please charge any fees to Deposit Account 08-2025 under 37 CFR 1.16 through 1.21 inclusive, and any other sections in Title 37 of the Code of Federal Regulations that may regulate fees. A duplicate copy of this sheet is enclosed.

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( ) I hereby certify that this paper is being transmitted to the Patent and Trademark Office facsimile number _____ on _____

Number of pages:

Typed Name: Hugh P. Gortler

Signature: _____

Rev 05/03 (Aplbrief)

Respectfully submitted,

D. Amnon Silverstein

By _____

Hugh P. Gortler

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Date: 3/10/2003

Telephone No.: (949) 454-0898

Patent
Docket No. 10992107-1

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS
AND INTERFERENCES

APPEAL NO. _____

In re Application of:
D. Amnon Silverstein

Serial No. 09/597,960
Filed: June 20, 2000

For: **COLLAPSIBLE COMPUTER MOUSE**

APPELLANT'S BRIEF ON APPEAL

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to: Assistant Commissioner for Patents Washington, D.C. 20231 on May 10, 2003.

HUGH P. GORTLER, Reg. No. 33,890

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INDEX

1. REAL PARTY IN INTEREST

The real party in interest is the assignee, Hewlett-Packard Company.

2. RELATED APPEALS AND INTERFERENCES

Appellant is not aware of any appeals or interferences that would have a bearing on the Board's decision in the pending appeal.

3. STATUS OF CLAIMS

In the Office Action dated November 21, 2002 and made final, claims 1-3, 7, 9-12, 16 and 18 are rejected under 35 U.S.C. §103(a) as being unpatentable over Derocher et al. U.S. Patent No. 6,304,249 in view of Krishan et al. U. S. Patent No. 5,822,692; and claims 5-6, 15 and 19 are rejected under 35 U.S.C. §103(a) as being unpatentable over Derocher et al. in view of Lee U.S. Patent No. 6,392,632. Claims 13-14 and 17 are also rejected under 35 U.S.C. §103(a).

The rejections of claims 1-3, 5-7, and 9-19 are being appealed. The claims under appeal are listed in Appendix A.

4. STATUS OF AMENDMENTS

No amendment was filed subsequent to final rejection.

5. SUMMARY OF THE INVENTION

A computer mouse is a popular pointing device for desktop computers. A full-size computer mouse is convenient to grasp, simple to move and easy to operate. With the flick of a wrist and the click of a button, an application can be launched, a function can be selected, text can be deleted or a line can be drawn.

While the computer mouse is a popular pointing device for desktop computers, a full-size mouse is not as popular for notebooks and other portable

computers. A full-size mouse is relatively large and inconvenient to store and transport.

Reduced-size mice have been proposed for notebooks. However, reduced-size mice are more difficult to handle and control.

The present invention overcomes these problems. Computer mice according to different aspects of the present invention are illustrated in Figures 1-7B of the application, which are attached hereto as Appendix B.

Reference is made to Figures 1-3. According to one aspect of the present invention, a computer mouse (104) includes a motion sensor (108) and a collapsible housing (106) for the motion sensor (108). The mouse (104) is sized to fit within a PCMCIA slot when the housing (106) is fully collapsed.

According to another aspect of the present invention, a computer mouse (104) includes a motion sensor (108), and a collapsible housing (106) for the motion sensor (108). The collapsible housing (106) includes a rigid base (106a) and an upper portion (106b) attached to the base (106a). The upper portion (106b) is made of an elastic material that allows the housing (106) to be collapsed

Reference is now made to Figures 4A-4C. According to yet another aspect of the present invention, a computer mouse (204) includes a motion sensor (218) and a collapsible housing (206) for the motion sensor (218). The collapsible housing (206) includes a resilient plastic sheet (212) having fold lines (214) that allow the housing (206) to collapse into a relatively flat structure.

Reference is now made to Figures 3 and 6A-7B. According to still another aspect of the present invention, a computer mouse (106) includes a motion sensor (108) including a sensor chip (108a), and a collapsible housing (106) for the motion sensor (108). The sensor chip (108a) is movable between a stowed position (Figs. 6B and 7B), and a deployed position (Figs. 6A and 7A).

A computer mouse according to the present invention can be conveniently transported with notebook computers and other portable devices. Yet a computer mouse according to the present invention is still convenient to handle and control.

6. THE ISSUES

a. Whether the Derocher et al. patents can be used in a '103 rejection.
b. Whether Derocher et al. or Lee teach or suggest a computer mouse housing with fold lines that allow the housing to collapse.
c. Whether Derocher et al. or Lee teach or suggest a computer mouse in which a sensor chip is moveable between stowed and deployed positions.
d. Whether Derocher et al. or Krishan et al. teach or suggest storing a computer mouse within a PCMCIA slot.
e. Whether Derocher et al. or Lee teach or suggest a computer mouse housing including a rigid base and an upper portion made of an elastic material that allows the housing to be collapsed.

7. GROUPING OF CLAIMS

Claims 1-3, 5-7, and 9-19 stand or fall together with respect to issue a.
Claims 6, 7, and 14 stand or fall together with respect to issue b.
Claims 15 and 19 stand or fall together with respect to issue c.
Claims 1, 9-11, and 18 stand or fall together with respect to issue d.
Claims 5, 2, 3, 12, and 13 stand or fall together with respect to issue e.

8. ARGUMENTS

I
THE REJECTIONS OF CLAIMS 1-3, 5-7 AND 9-19 SHOULD BE WITHDRAWN BECAUSE THE DEROCHER ET AL. PATENTS CANNOT BE USED IN '103 REJECTIONS

All of the claims on appeal are rejected under 35 USC §103(a) as being unpatentable over Derocher et al. in view of others.

35 USC §103(c) states that "Subject matter developed by another person, which qualifies as prior art only under one or more of subsections (e), (f), and (g) of section 102 of this title, shall not preclude patentability under this section where the subject matter and the claimed invention were, at the time the invention was made, owned by the same person or subject to an obligation of assignment to the same person."

Two Derocher et al. patents are cited in the office action: Derocher et al. U.S. Patent No. 6,304,249 filed on Sept. 24, 1999 and issued on Oct. 16, 2001; and Derocher et al. U.S. Patent No. 6,476, 795 filed on January 20, 2000 and issued on November 5, 2002 (cover sheets of these two patents are attached as Appendices C and D).

Both Derocher et al. patents are prior art under subsection (e) of section 102, since the present application was filed on June 20, 2000. The two Derocher et al. patents and the present application are assigned to Hewlett-Packard Company. Therefore, the Derocher et al. patents shall not preclude patentability under section 103. Accordingly, the '103 rejections of claims 1-3, 5-7 and 9-19 should be withdrawn.

II

THE '103 REJECTION OF CLAIM 6 AND ITS DEPENDENT CLAIMS 7 AND 14 SHOULD BE WITHDRAWN BECAUSE NEITHER DEROCHER ET AL. NOR LEE TEACH OR SUGGEST A COMPUTER MOUSE INCLUDING A COLLAPSIBLE HOUSING HAVING FOLD LINES THAT ALLOW THE HOUSING TO COLLAPSE

The office action contends that a computer mouse housing having fold lines is disclosed in Figures 4-6, 11-13 and 18, and passages at col. 6, lines 17-52 and col. 7, lines 44-67 of Derocher et al. '249. Relevant portions of Derocher et al. are attached as Appendix C.

Figures 4-6 and col. 5, lines 15-16 of Derocher et al. describe a mouse cover 44 that slides between a first position and a second position (see Appendix C). Sliding occurs as a rail 48 moves along a track 46 (see Fig. 10 and col. 5, lines 19-20). Folding along fold lines is not taught or suggested.

The housing 64 of Figures 11-13 does not fold; it only flexes between a bowed position and a flat position. See col. 6, lines 32-34.

Fig. 18 shows a computer mouse body having first and second portions 112 and 114 that can be moved about a hinge 116 (col. 7, lines 44-53). There is no teaching or suggestion of folding along fold lines.

Lee was cited simply to show that optical sensors are used in computer mice. Lee does not teach or suggest a computer mouse housing having fold lines that allow the housing to be collapsed

Because neither Derocher et al. '249 nor Lee teach or suggest the computer mouse of claim 6, the '103 rejection of claim 6 and its dependent claims 7 and 14 should be withdrawn.

III
THE '103 REJECTION OF CLAIM 15 AND ITS DEPENDENT CLAIM 19 SHOULD BE WITHDRAWN BECAUSE NEITHER DEROCHER ET AL. NOR LEE TEACH OR SUGGEST A COMPUTER MOUSE IN WHICH A SENSOR CHIP CAN BE MOVED BETWEEN A STOWED POSITION AND A DEPLOYED POSITION

The office action acknowledges that Derocher et al. '249 do not teach or suggest a sensor chip that can be moved between stowed and deployed positions. According to the office action, however, this limitation is suggested at col. 1, lines 5-45 of Lee (see appendix E).

Lee makes no such suggestion. All the passage at col. 1, lines 5-45 establishes is that optical sensors are used in computer mice. Because neither Derocher et al. '249 nor Lee teach or suggest the computer mouse of claim 15, the '103 rejection of claim 15 and its dependent claim 19 should be withdrawn.

IV
THE '103 REJECTION OF CLAIMS 1, 9-11AND 18 SHOULD BE WITHDRAWN BECAUSE NEITHER DEROCHER ET AL. OR KRISHAN ET AL. TEACH OR SUGGEST STORING A MOUSE IN A PCMCIA SLOT

According to the office action, Derocher et al. '249 disclose a mouse that can be collapsed, and Krishan et al. disclose a computer having a PCMCIA slot. Based on these two facts, the office action concludes that it would be obvious "to incorporate Krishan's notebook computer having PCMCIA card into Derocher's collapsible computer mouse."

However, the office action does not address the limitation concerning size of the computer mouse (claim 1 recites "the mouse sized to fit within a PCMCIA slot when the housing is fully collapsed"). Moreover, neither Derocher et al. nor Krishan et al. teach or suggest a mouse that is sized to fit within a PCMCIA slot. The office action simply makes a bald, unsubstantiated conclusion of obviousness.

Because neither Derocher et al. nor Krishan et al. teach or suggest storing a computer mouse in a PCMCIA slot, the '103 rejection of claims 1, 9-11 and 18 should be withdrawn.

V
THE '103 REJECTION OF CLAIM 5 AND ITS DEPENDENT CLAIMS 2, 3, 12 AND 13 SHOULD BE WITHDRAWN BECAUSE NEITHER DEROCHER ET AL. NOR LEE TEACH OR SUGGEST A COMPUTER MOUSE HOUSING WITH A RIGID BASE AND AN UPPER PORTION MADE OF AN ELASTIC MATERIAL

Derocher et al. '249 do not disclose a computer mouse housing including a rigid base and an upper portion attached to the rigid base, wherein the upper portion is made of an elastic material that allows the housing to be collapsed. The upper surface of Derocher et al.'s housing 64 is formed of a flexible, rubber-like material for the express purpose of "allowing the housing to flex along its length." See col. 6, lines 32-34 and Figs. 11-13 (attached as Appendix C).

Figs. 11-13 clearly show that the upper portion does not collapse; it only flexes between a "bowed" position and a "flat" position. The mouse might collapse, but the upper portion of the housing does not.

Flexing is caused by a support arm 72 of a lever 66. According to col. 6, lines 39+, the support arm 72 causes the upper surface to flex when the lever is rotated.

Lee was cited simply to show that optical sensors are used in computer mice. Lee does not teach or suggest a computer mouse housing including a rigid base and an upper portion made of an elastic material.

Because neither Derocher et al. '249 nor Lee teach or suggest the computer mouse of claim 5, the '103 rejection of claim 5 and its dependent claims 2, 3, 12 and 13 should be withdrawn.

9. CONCLUSION

The '103 rejections of the claims should be withdrawn because Derocher et al. cannot be used in a '103 rejection, and because Derocher et al., Lee and Krishan et al. do not teach or suggest the computer mice according to the present invention. Appellant respectfully requests the Honorable Board of Patent Appeals and Interferences to reverse the '103 rejections.

Respectfully submitted,

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Date: May 10, 2003

10. APPENDIX

Appendix A. The Claims on Appeal

The appealed claims 1-3, 5-7 and 9-19 are as follows:

1. A computer mouse comprising:

a motion sensor; and

a collapsible housing for the motion sensor, the mouse sized to fit within a PCMCIA slot when the housing is fully collapsed.

2. The mouse of claim 5, wherein the housing is collapsible into a relatively flat structure.

3. The mouse of claim 5, wherein the motion sensor includes an optical sensor.

5. A computer mouse comprising:

a motion sensor; and

a collapsible housing for the motion sensor, the collapsible housing including a rigid base and an upper portion attached to the base, the upper portion made of an elastic material that allows the housing to be collapsed.

6. A computer mouse comprising:

a motion sensor; and

a collapsible housing for the motion sensor, the collapsible housing including a resilient plastic sheet having fold lines that allow the housing to collapse into a relatively flat structure.

7. The mouse of claim 6, wherein the resilient plastic sheet includes a top portion, a base and inwardly-collapsible sidewalls between the top portion and the base, the sidewalls having the fold lines.

9. The mouse of claim 1, further comprising a retractable cable assembly within the housing.

10. The mouse of claim 1, further comprising a transmitter within the housing.

11. The mouse of claim 1, further comprising a PCMCIA connector mounted to the housing.

12. The mouse of claim 5, wherein the housing has a deflectable mouse button area; and wherein the mouse further comprises at least one sensor for detecting when the area is deflected; whereby deflecting the area corresponds to clicking a mouse button.

13. The mouse of claim 5, further comprising a sensor within the housing, the sensor detecting housing volume changes that correspond to mouse clicks.

14. The mouse of claim 6, further comprising a bendable strip cantilevered from the housing; and a sensor for detecting when the strip is bent; whereby bending the strip corresponds to clicking a mouse button.

15. A computer mouse comprising
a motion sensor including a sensor chip; and
a collapsible housing for the motion sensor;

the sensor chip movable between a stowed position and a deployed position.

16. A combination comprising
a mouse including a collapsible housing; and
a PCMCIA card for communicating with the mouse.

17. The combination of claim 16, further comprising a flat battery within the housing and a battery charger within one of the mouse and the PCMCIA card.

18. The combination of claim 16, further comprising a portable computer having first and second PCMCIA slots, the mouse sized to fit in one of the PCMCIA slots.

19. The mouse of claim 15, wherein the motion sensor also includes a lens, and wherein the sensor chip is moved relative to the lens when the housing is collapsed.

Appendix B

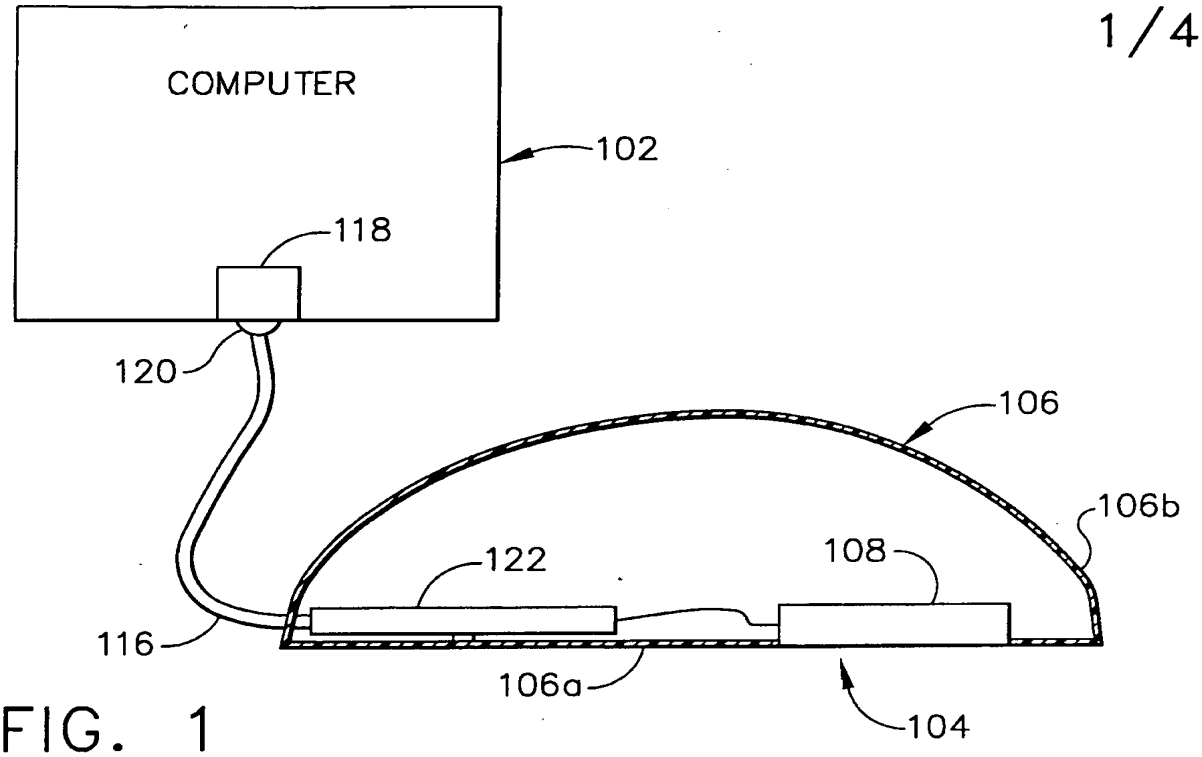

FIG. 1

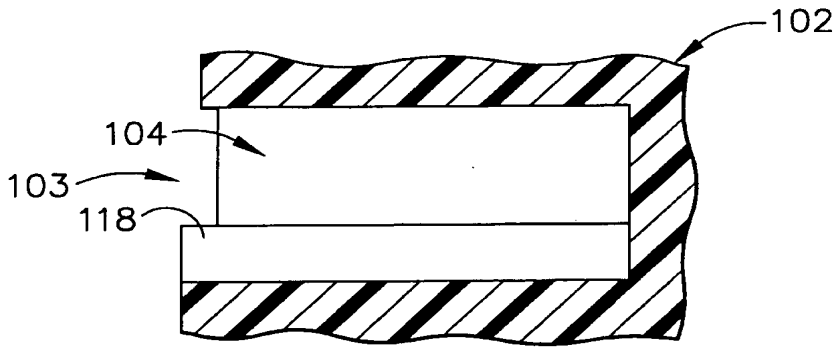

FIG. 2

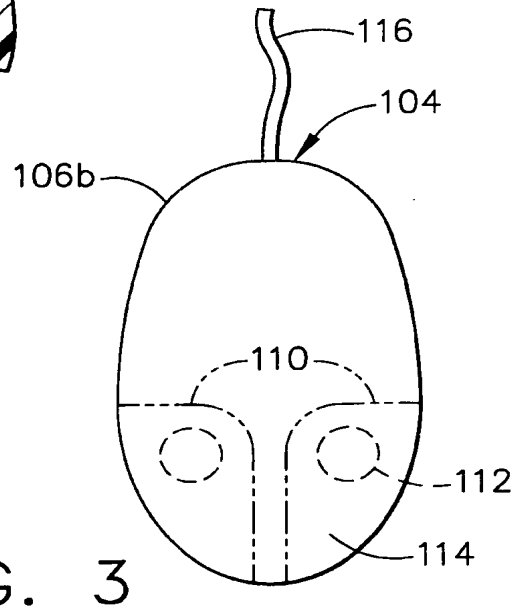

FIG. 3

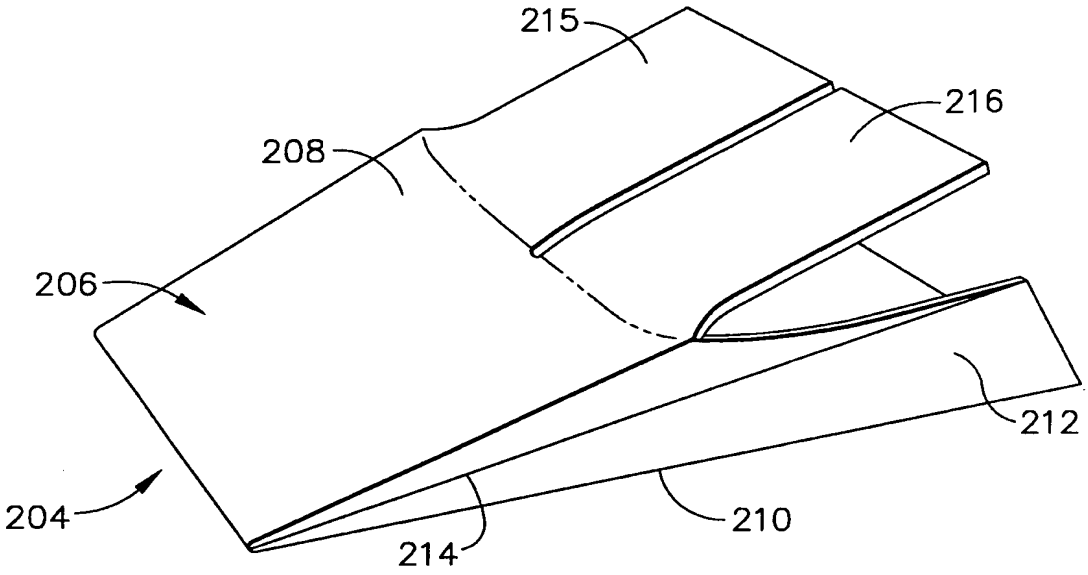

FIG. 4A

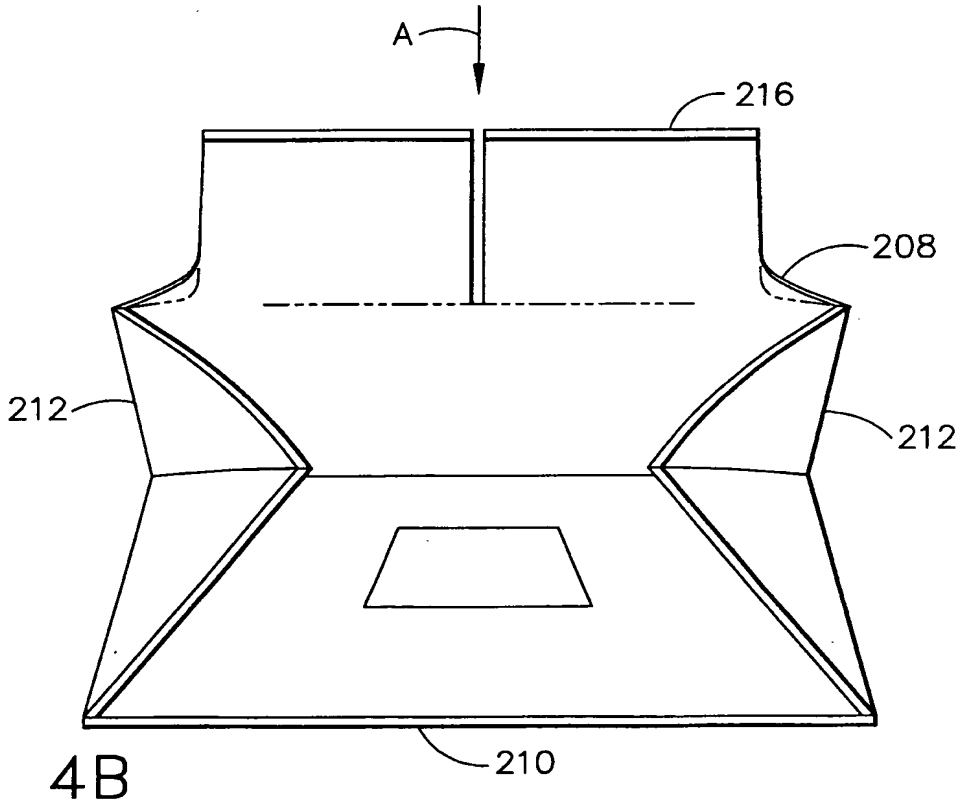

FIG. 4B

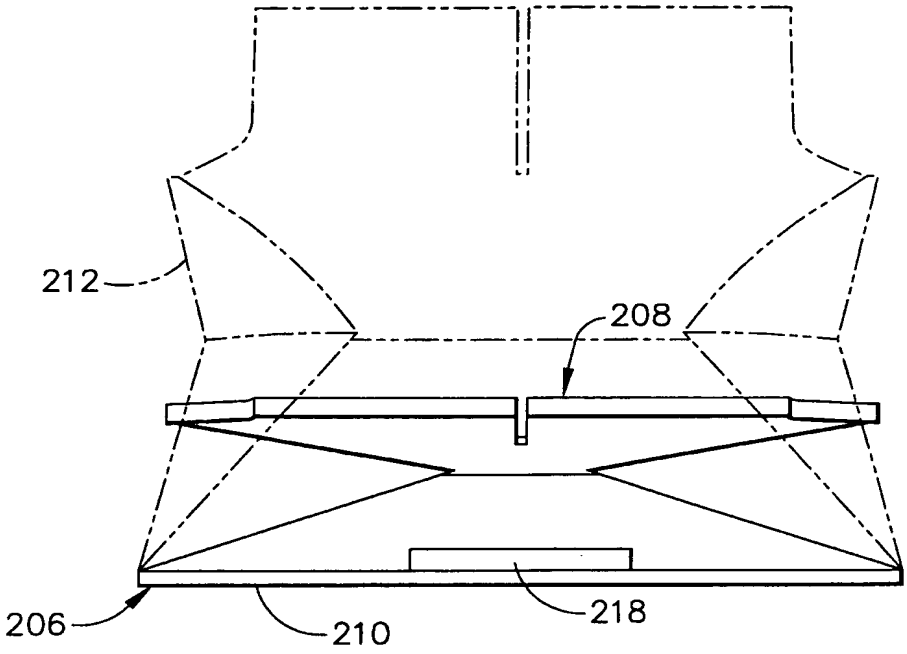

FIG. 4C

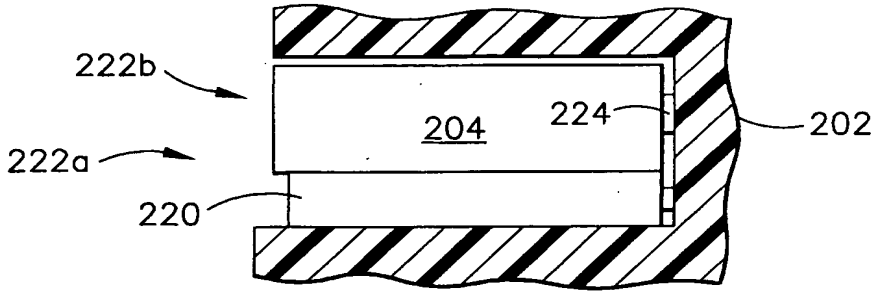

FIG. 5

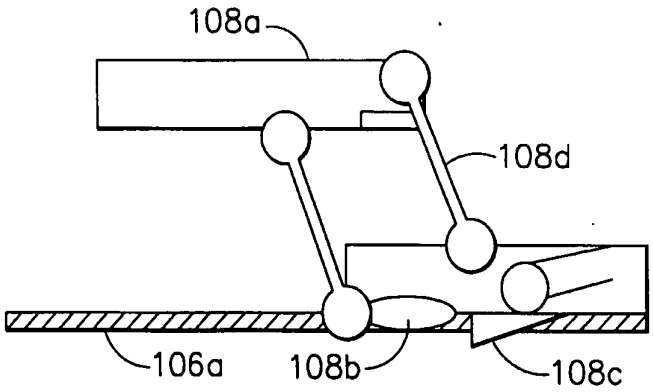

FIG. 6A

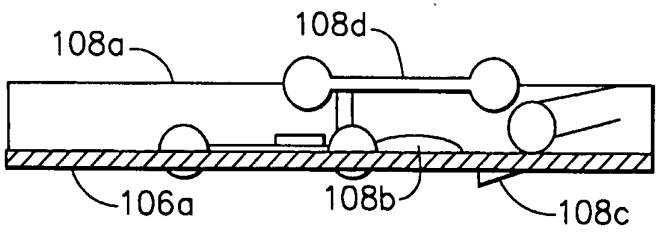

FIG. 6B

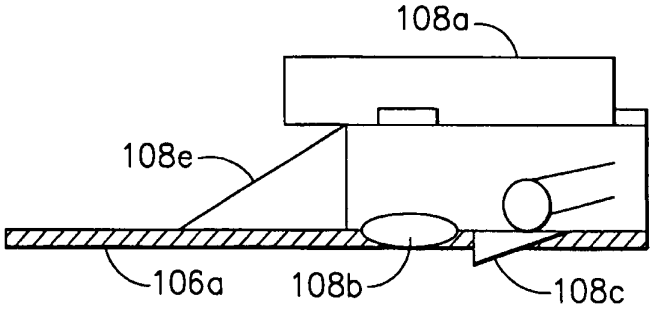

FIG. 7A

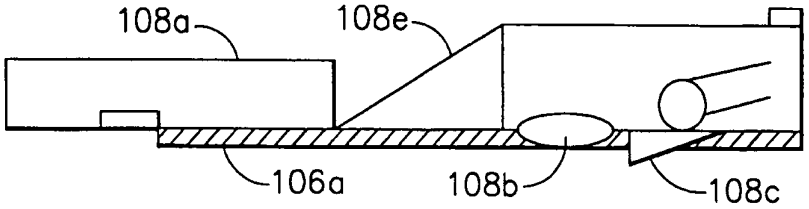

FIG. 7B

Appendix C

US006304249B1

(12) **United States Patent**
Derocher et al.

(10) **Patent No.: US 6,304,249 B1**
(45) **Date of Patent: Oct. 16, 2001**

(54) **COLLAPSIBLE PORTABLE MOUSE**

(75) Inventors: **Michael D Derocher**; **Glen A Oross**, both of Corvallis, OR (US); **Jacques H Helot**, San Mateo, CA (US)

(73) Assignee: **Hewlett-Packard Company**, Palo Alto, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/405,601**

(22) Filed: **Sep. 24, 1999**

(51) **Int. Cl.**[7] **G09G 5/08**
(52) **U.S. Cl.** **345/163**; 248/118.1
(58) **Field of Search** 345/163–167, 345/156, 157, 158; D14/402–410, 432, 433; 248/118, 118.1, 118.3, 118.5; 361/683, 686

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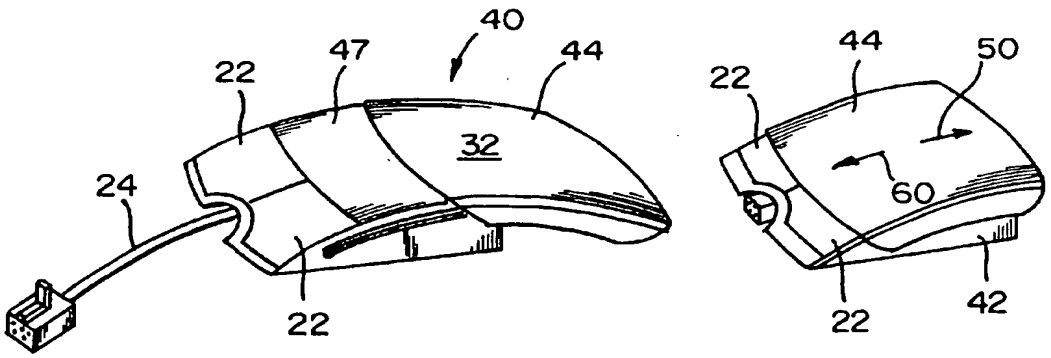
Primary Examiner—Regina Liang

(57) **ABSTRACT**

A computer mouse collapses into a smaller form. In one embodiment a cover slides to hide or reveal buttons and collapse or extend the length of the mouse. In another embodiment a lever is moved in one direction to bow the mouse surface and reveal buttons. Move the lever the other way and the mouse collapses in height and the buttons are hidden. In another embodiment a contoured leaf spring shapes the mouse. When relaxed, the spring is generally convex. Push down on the mouse and a latch captures the spring in an extended position reducing the height for storage and transport. Release the latch and the spring relaxes popping the mouse into an operable configuration. In another embodiment the mouse folds in half.

34 Claims, 5 Drawing Sheets



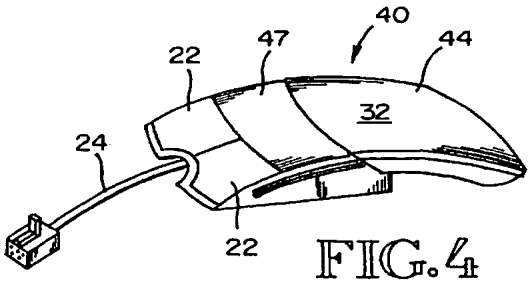
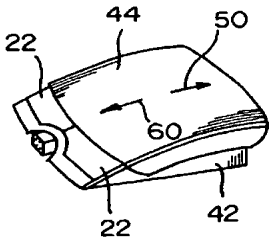


FIG. 4

FIG. 5



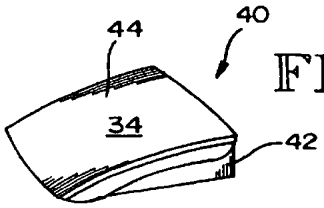


FIG. 6

FIG. 7

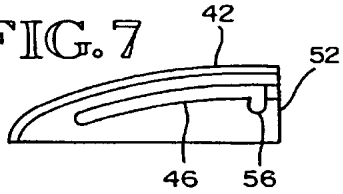


FIG. 8

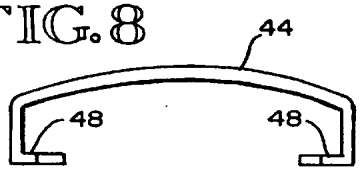
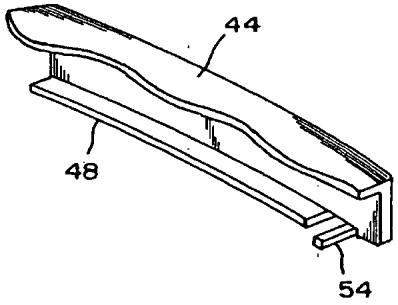


FIG. 9



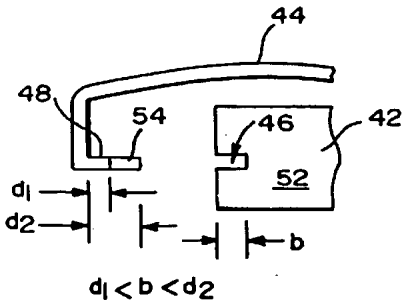


FIG. 10

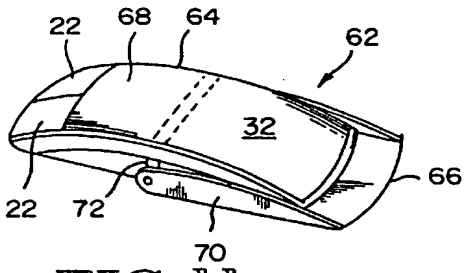


FIG. 11

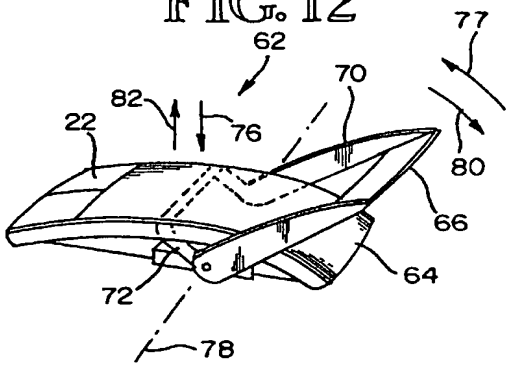


FIG. 12

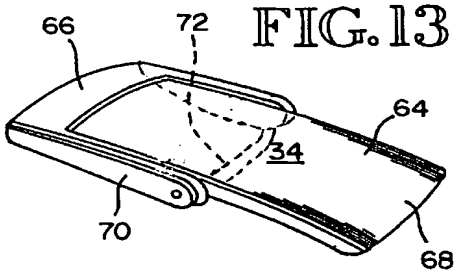


FIG. 13

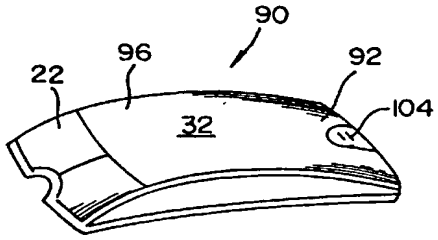


FIG. 14

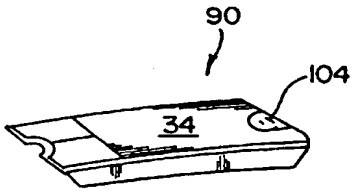


FIG. 15

FIG. 16

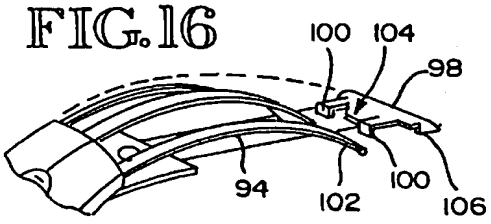
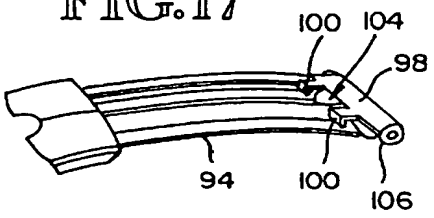


FIG. 17



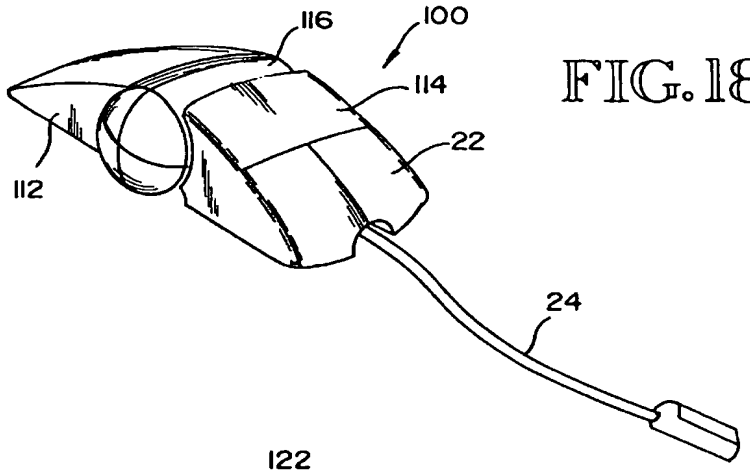


FIG. 18

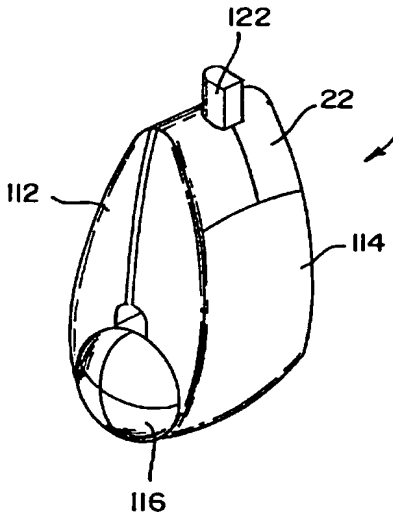
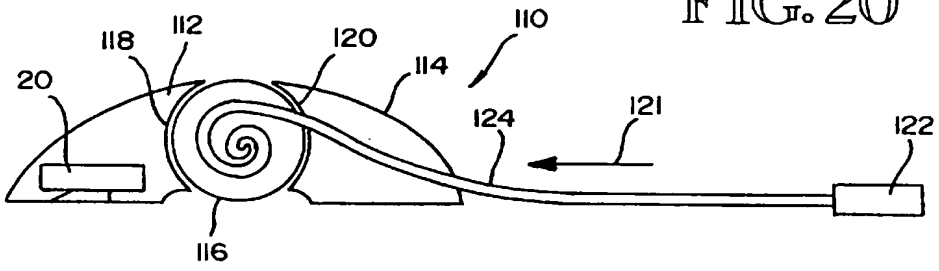


FIG. 19

FIG. 20



mouse by a user. The mouse **10/10'** is collapsible to a reduced volume for storage and transport. In one embodiment the mouse is reduced in length to achieve a storage configuration **34**. In another embodiment the mouse is reduced in height to achieve the storage configuration **34'**.

Reduced-Length Collapsible Mouse Embodiment

Referring to FIGS. **4–10**, an embodiment of the mouse **10** is shown as a collapsible length mouse **40**. Although the mouse **40** is shown with a cable **24**, in an alternative embodiment the mouse **40** may embody the mouse **10'** as a wireless mouse. The body of mouse **40** includes a housing **42** which houses the tracking system **20** and the communication interface. In addition, the mouse buttons **22** are exposed to form part of the housing **42**.

The mouse body also includes a cover **44** which moves between a first position and a second position. Various structures may be implemented to allow movement of the cover **44** between the first position and the second position. In one embodiment the housing **42** includes a track **46** along which a rail **48** of the cover **44** is able to move. To change from the storage configuration **34** (see FIG. **6**) to the operable configuration **32** (see FIG. **4**), the cover **44** is slid by the operator from the second position to the first position in a direction **50**. In some embodiments a bump or other structure is surmounted at the start of the motion to release the cover. Such bump (not shown) serves to keep the cover from gliding when the mouse is being stored or transported.

As the cover rail **48** traverses the track **46**, the rail **48** runs off the rear edge **52** of the housing **42** (see FIG. **10**) until a protrusion **54** in the cover **44** reaches the rear edge **52**. Referring to FIG. **10**, the rear surface of the housing **42** has an opening for the track **46**. Such opening is to a distance b along the rear surface **52**. The width dl of the rail **48** is less than the distance b, allowing the rail **48** to run off the track **46**. The protrusion **54** however has a width d2 which is greater than distance b and width d1. The opening is not big enough for the protrusion **54**. Thus, the protrusion blocks the cover **44** from sliding all the way off the track and separating from the housing **42**. Rather than slide off the track **46**, the protrusion **54** moves downward into an adjacent notch **56** at the end of the track **46**. The cover being a generally rigid structure moves down also allowing the cover **44** to settle into the first position. The mouse **40** now is in the operable configuration **32** (see FIG. **4**).

To store the mouse **40**, the cover is lifted to raise the protrusion **54** from the notch **56** and advance the protrusion **54** and rail **48** along the track **46**. Accordingly, the cover is moved in a direction **60** (see FIG. **5**). The cover **44** is slid in direction **60** until snapping into place by traversing the bump structure (not shown) in the second position. This corresponds to the storage configuration **34** (see FIG. **6**). In the embodiment illustrated, the cover **44** conceals the buttons **22** and the communication interface while in the storage configuration. In other embodiments, only a portion of the buttons or none of the buttons are concealed. Still further in some embodiments the cover need not conceal the communication interface. In some embodiments the cable **24** is spring-loaded to retract into the mouse **40** (e.g., when changing into the storage configuration). In one embodiment the cable **24** winds around the tracking system **20** within the housing **42**.

Although the cover is shown to move along an upper surface of the housing **42**, in an alternative embodiment the cover may instead move along an opposite undersurface of the housing **42**. Further, although a rail and track are described for allowing movement of the cover between the first position and the second position, other structures may be used instead to allow such movement. For example, the cover may be spring-biased in a downward direction, but be liftable away from the housing **42** by the operator. The cover, for example may lock into place at the first position and second position and be lifted opposing the spring-biasing to allow movement of the cover from one such position to the other position. In another embodiment the cover may be hinged to the housing **42** and rotate about the hinge in one direction for storage and rotate in another direction for operation. Thus, one face of the cover is exposed when the cover is positioned for storage and another face is exposed when the cover is positioned for operation of the mouse. Such hinged cover may rotate the cover to conceal an upper surface of the housing **42** (i.e., surface with buttons **22**) or to cover an underside of the housing **42**.

Lever-Driven Collapsible Mouse

Referring to FIGS. **11–13**, a collapsible height mouse **62** embodies the mouse **10** or mouse **10'** of FIGS. **1** and **2**. The body of mouse **62** includes a housing **64** and a lever **66**. The housing **64** houses the tracking system **20** and the communication interface. The mouse buttons **22** are exposed to form part of the housing **64**.

The lever **66** moves between a first position and a second position to collapse the mouse **62** from a first height to a reduced second height. FIG. **11** shows the mouse in the operable configuration **32** with the lever **66** in the first position and the mouse having the first height. FIG. **13** shows the mouse **62** in the storage configuration with the lever **66** in the second position and the mouse at the reduced, second height. In one embodiment the mouse **64** is generally flat while in the storage configuration **34**.

Preferably the housing **64** includes a flexible rubber-like upper surface which allows the housing to flex along its length. The lever **66** includes a lever arm section **70** and a support arm **72**. While the mouse **62** is in the operable configuration **34**, the support arm **72** supports the underside of the housing upper surface **68** providing a generally convex shape to the housing **64**.

To collapse the mouse **62**, the lever arm is moved from the first position to the second position rotating the lever **66** in direction **74**. This collapses the housing **64** in a direction **76**. Such collapsing occurs as the support arm **72** is rotated about an axis **78** formed by the lever **66**. As the lever arm is rotated in direction **74**, the support arm eventually extends parallel with the housing **64** upper surface. As the lever arm continues to rotate in direction **74** the lever arm section **70** moves relative to the support arm **72** about axis **78**. When the lever **66** reaches the second position (see FIG. **13**) the support arm **74** and lever arm section **72** are generally parallel extending with the length of the housing **64**. This position corresponds to the reduced height storage configuration of the mouse **62**.

To prepare the mouse for operation, the lever **66** is moved from the second position toward the first position in direction **80** (see FIG. **12**). At the beginning of the motion, the lever arm portion **70** rotates in direction **80** while the support arm remains stationary. Eventually, the continued rotation of the lever arm portion **70** brings a notch (not shown) into contact with the support arm **72** forcing the support arm **72** to move with the lever arm portion **70**. During the continued motion of the lever **66**, the support arm lifts the upper surface **68** of the housing **64** in a direction **82** toward the increased, first height.

Spring-Loaded Collapsible Mouse

Referring to FIGS. **14–17**, another collapsible height mouse **90** also embodies the mouse **10** or mouse **10'** of FIGS. **1** and **2**. The body of mouse **90** includes a housing **92** and

a leaf spring **94**. The housing **92** houses the tracking system **20** and the communication interface. The mouse buttons **22** are exposed to form part of the housing **92**.

The leaf spring **94** has a contoured relaxed state and a generally flattened extended state. A flexible rubber-like upper surface **96** of the housing **92** is supported by the leaf spring **94**. More particularly, the leaf spring defines the general contour of the upper surface **96** upon which an operator's palm rests during use. FIG. **14** shows the mouse **90** in the operable configuration **32** with the leaf spring **94** in the relaxed contoured state. Accordingly, the mouse **90** has a generally convex shape and reaches to a first height. This corresponds to the operable configuration. FIG. **15** shows the mouse **90** in the storage configuration **34** with the leaf spring captured in an extended flattened state. Accordingly, the mouse **90** has a generally flat shape and reaches to a reduced, second height. This corresponds to the storage configuration.

To extend the leaf spring, the operator merely pushes down on the upper surface **96** of the housing in an effort to flatten the housing **92**. This reduces the height to the second height and moves the mouse from the operable configuration to the storage configuration.

To release the leaf spring **94**, the operator presses on a latch **98** button **104**. The leaf spring **94** in response returns to its contoured relaxed state. The housing correspondingly follows the contour of the spring **94** and increases height to the first height putting the mouse into the operable configuration. Preferably the spring constant of the leaf spring **94** is high enough to allow the mouse **90** to support an operator's hand without collapsing into the storage configuration.

Referring to FIGS. **16** and **17**, in one embodiment the latch **98** includes hooks **100** which clasp an end **102** of the leaf spring to hold the leaf spring **94** in the extended position. Depressing the button **104** of the latch **98** releases a spring **106** of the latch which moves the hooks out of contact with the end of the leaf spring **94**. In response the leaf spring moves to its relaxed state. When the operator flattens the mouse **90**, the leaf spring extends pushing against the latch and causing the latch to move the hooks **100** in clasping position. The hooks **100** stay in the clasping position until released by button **104**.

Folding Mouse

Referring to FIGS. **18–20**, an embodiment of the mouse **10** is shown as a collapsible length mouse **110**. Although the mouse **110** is shown with a cable **24**, in an alternative embodiment the mouse **110** may embody the mouse **10'** as a wireless mouse. The body of mouse **110** includes a first housing **112**, and a second housing **114** and a hinge **116**. The first housing **112** houses the tracking system **20** and the communication interface. In addition, the mouse buttons **22** are exposed to form part of the first housing **112** or the second housing **114**.

The mouse **110** changes between the storage configuration and the operable configuration by moving the first housing and second housing about the hinge **116**. In one embodiment the hinge is a cylindrical structure. Each of the first housing **112** and the second housing **114** have an edge **118, 120** respectively contoured to the cylindrical hinge **116**. FIG. **18** shows the mouse **110** in the operable configuration, in which the first and second housing **112, 114** are extended about the hinge **116** allowing for a first length of the mouse **110**.

In the operable configuration, the upper surfaces of the first housing **112**, the second housing **114** and the hinge **116** form a generally convex upper surface upon which an operator's palm rests. The cable **24**, if present, extends from one of the first housing **112** and the second housing **114**. To move into the storage configuration, the mouse **110** is folded about the hinge **116**. Specifically, the second housing **114** and/or the first housing **112** moves about the hinge **116** to fold the mouse **110** in half, as shown in FIG. **19**. In the storage configuration of FIG. **19**, the mouse **110** has a reduced length relative to the length while in the operable configuration.

In various embodiments the cable **24** retracts in direction **121** into the mouse **110** to allow easy storage. Referring to FIG. **20**, the cable **24** winds up within the cylindrical hinge **116**. In one embodiment, the hinge **116** is rotatable even while the mouse **110** is in the storage configuration to allow the operator to wind up the cable **124** by turning the hinge **116**. In another embodiment the cable is spring-loaded. When the operator folds the mouse **110**, the spring loading force retracts the cable into the mouse **110** to be wound up within the hinge **116**. To extend the cable the operator pulls the cable **24** at connector **122**.

Portable Computer Mouse Storage Areas

FIG. **21** is a perspective illustration of an exemplary host computer, a portable computer **12'**. Portable computer **12'** has a computer screen **18** having a cursor **16** controlled by a pointing device, a mouse **10/10'** incorporating at least one embodiment of the invention. Mouse **10/10'** can be adjusted between a first operable position and a second reduced volume storage configuration. When in the reduced volume storage configuration, mouse **10/10'** can be stored in the portable computer **12'** or other accessory by configuring a mouse storage area to adhere, clasp or otherwise removably attach the mouse case. Preferably the mouse **10/10'** is stored near the connector and port area in connector storage area **134**. Alternatively, the mouse **10/10'** can be stored in an AC adapter **130** in adapter storage area **132**. Yet another alternative for storing the mouse **10/10'** with the portable computer **18** is to provide a carrier **138** that can be inserted in a battery slot **140** or a mass storage drive bay of the portable computer **12'**. The carrier **138** is configured to accept mouse **10/10'** in its storage configuration state in carrier mouse storage area **136**.

FIG. **22** is a perspective illustration of the portable computer **12'** of FIG. **21** oriented to observe the underside of the portable computer **12'**. Another alternative for storing mouse **10/10'** in its reduced volume configuration is provided by underside mouse storage area **142**. Although several mouse storage areas have been illustrated, preferably only one mouse storage area is implemented on a portable computer although multiple storage areas as well as other possible storage areas would still meet the spirit and scope of the invention.

Meritorious and Advantageous Effects

According to an advantage of the invention, the collapsible mouse reduces the mouse volume while in the storage configuration allowing for easier storage and transport. In various embodiments the mouse length or height is reduced while in the storage configuration. According to another advantage of the invention, an operator can quickly change the mouse between the operable configuration and the storage configuration.

Although a preferred embodiment of the invention has been illustrated and described, various alternatives, modifications and equivalents may be used. Therefore, the foregoing description should not be taken as limiting the scope of the inventions which are defined by the appended claims.

What is claimed is:

1. A pointing apparatus controlling movement of an on-screen reference for a computer, comprising:

a tracking device which generates movement signals based on movement of the pointing apparatus, the

Appendix D

US006476795B1

(12) **United States Patent**
Derocher et al.

(10) **Patent No.: US 6,476,795 B1**
(45) **Date of Patent: Nov. 5, 2002**

(54) **MOUSE RECHARGING MODULE**

(75) Inventors: **Michael D Derocher**, Corvallis, OR (US); **Jacques H Helot**, Rotterdam (NL)

(73) Assignee: **Hewlett-Packard Company**, Palo Alto, CA (US)

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/491,081**

(22) Filed: **Jan. 20, 2000**

(51) **Int. Cl.**[7] **G09G 5/08**

(52) **U.S. Cl.** **345/163**; 345/156; 345/157; 345/167; 345/168; 345/169; 361/683; 361/686; 320/114; 320/115

(58) **Field of Search** 345/156, 157, 345/163, 167–169, 179; 361/683, 686; 320/114, 115

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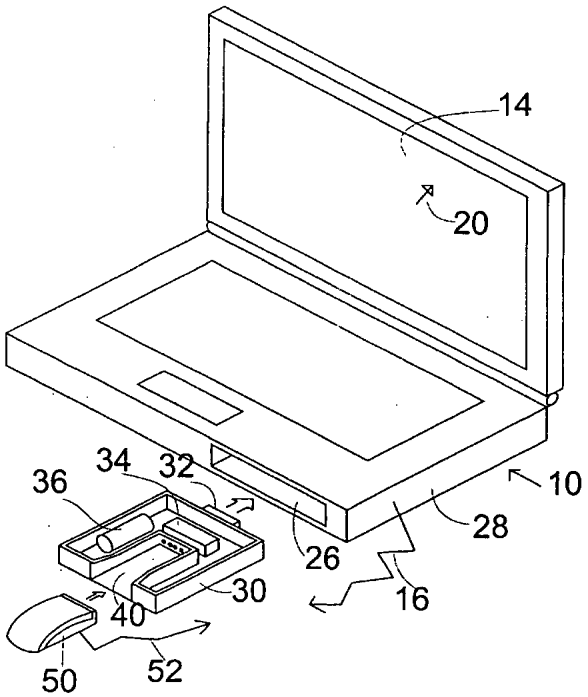
(74) *Attorney, Agent, or Firm*—Timothy F. Myers

(57) **ABSTRACT**

A portable computer system has a screen attached to a base housing having an accessory bay and a first wireless transceiver. The screen has a cursor positioned by a mouse having a second wireless transceiver in contact the first wireless transceiver of the portable computer. A module, capable of insertion and removal from the accessory bay, has a mouse bay and connector for coupling to the mouse. When the mouse is in the mouse bay, a battery in the mouse is recharged.

18 Claims, 4 Drawing Sheets



Appendix E

US006392632B1

(12) **United States Patent**
Lee

(10) **Patent No.: US 6,392,632 B1**
(45) **Date of Patent: May 21, 2002**

(54) **OPTICAL MOUSE HAVING AN INTEGRATED CAMERA**

(75) Inventor: **Wen-Chieh Geoffrey Lee**, Hsinchu (TW)

(73) Assignee: **Windbond Electronics, Corp.**, Taiwan

(*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 0 days.

(21) Appl. No.: **09/207,425**

(22) Filed: **Dec. 8, 1998**

(51) **Int. Cl.**[7] **G09G 5/08**

(52) **U.S. Cl.** **345/158**; 345/156; 345/163; 345/166; 382/313; 382/314

(58) **Field of Search** 345/158, 163, 345/166, 156; 382/313, 314

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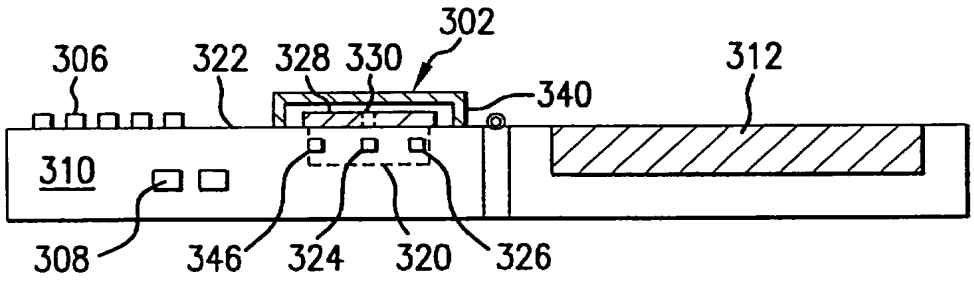
Assistant Examiner—Ali Zamani
(74) *Attorney, Agent, or Firm*—Raymond Sun

(57) **ABSTRACT**

The present invention provides an apparatus for capturing images and for manipulating a cursor. The apparatus can be used for operation in a first mode and a second mode. The apparatus includes an opto-electronic mechanism that is provided for receiving image signals. The apparatus also has a user-selectable trigger that allows a user to assert or de-assert a mode signal that determines whether operation is desired in the first mode or the second mode. The apparatus has a controller that is coupled to the opto-electronic mechanism and user-selectable trigger for receiving the mode signal. When operation is in the first mode, the received image signals are processed and used to control movement of a cursor on a screen or display. When operation is in the second mode, the received image signals are processed and displayed as video images on a PC.

22 Claims, 4 Drawing Sheets



OPTICAL MOUSE HAVING AN INTEGRATED CAMERA

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates generally to cursor control devices, and in particular, to an optical mouse having an integrated camera. The optical mouse with integrated camera can also be implemented with a notebook computer.

2. Background Art

To a personal computer (PC) user, the mouse is one of the basic devices utilized to input data into the PC, the other being the keyboard. Computer mice are often referred to as cursor positioning devices or cursor control devices, although mice are utilized to perform many other functions, such as to launch applications, re-size and move windows, drag, open and drop documents, select icons, text, menu items in a pull-down menu, and others. Unfortunately, the conventional computer mouse has several shortcomings.

First, prior art mice employ a rolling ball mechanism that is bulky. For example, for applications where space is a premium (e.g., lap-top computers), mice cannot be used effectively, and other cursor control devices, such as trackballs or touchpads, are preferred. Second, this ball mechanism wears out through use, and users often notice a degradation of mouse action and precision after extended use. In this regard, PC users have resigned themselves to the fact that when the ball mechanism is worn, they need to replace the worn mouse with a new mouse incurring undesirable hassle and costs. Third, even when the ball mechanism is not worn, the resolution and sensitivity of the conventional mouse is tolerable, but can be improved.

Recently, Logitech Corp. introduced a cursor control device marketed under the trademark "MARBLE". This device uses a trackball that is printed with a random pattern of dots. When the ball is moved, a light beam illuminates a small section of dots, and the image of this section is passed through a lens and reflected off a mirror. The reflected image is read by a sensor chip that calculates the movement of the dots. Unfortunately, this device requires a unique trackball having a special pattern of dots to feed the motion data to the sensor chip. Therefore, many of the above-mentioned drawbacks are still not resolved by this device.

In recent years, the advancement of complementary metal oxide semiconductor (CMOS) image sensor technologies has paved a way for the digital camera, video digital camera, and the PC camera to become the next low-cost peripheral device for the PC. For example, users can now use a PC camera and communication software (e.g., Microsoft's free software, Net-Meeting) to send and receive live video images to and from a remote PC through a telephone line or local area network (LAN).

Unfortunately, despite these advances in image sensor technologies, an average PC user is not ready to accept the PC camera except for in limited uses, such as in security surveillance systems. An unresolved challenge to the PC industry is how to make the PC camera more useful and accepted by the average PC user.

Accordingly, there remains a need for an improved cursor control device that overcomes the disadvantages set forth previously.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a cursor control device that does not require a rolling ball mechanism, and that is compact, cost-effective to manufacture, and immune to the wear that a rolling ball mechanism is susceptible to.

It is another object of the present invention to provide an optical cursor control device that uses captured images to detect motion of the cursor control device, thereby improving the resolution and sensitivity of the cursor control device.

It is another object of the present invention to provide a cursor control device that can include an integrated camera.

In order to accomplish the objects of the present invention, an apparatus is provided that captures images that are used to manipulate a cursor. The apparatus includes an opto-electronic mechanism that is provided for receiving image signals. The received image signals are processed using digital signal processing (DSP) techniques and used to control movement of a cursor on a screen or display. In one embodiment, the DSP includes motion estimation.

The apparatus can be also be used for operation in two modes. In this embodiment, the apparatus also has a user-selectable trigger that allows a user to assert or de-assert a mode signal that determines whether operation is desired in a first mode or a second mode. The apparatus has a controller that is coupled to the opto-electronic mechanism and user-selectable trigger for receiving the mode signal. When operation is in the first mode, the received image signals are processed using DSP, and used to control movement of a cursor on a screen or display. When operation is in the second mode, the received image signals are processed and displayed as video images on a PC.

In one embodiment of the present invention, the apparatus can be a stand-alone device (such as a mouse) that is coupled to a personal computer. In another embodiment of the present invention, the apparatus can be integrated into the housing of a notebook computer for use therewith.

Thus, the apparatus of the present invention provides a single mechanism that has at least two different uses: to control cursor movement, and to capture video images. When used as a cursor control device, the apparatus of the present invention does not require a rolling ball mechanism, and is compact, cost-effective to manufacture, and immune to the wear that a rolling ball mechanism is susceptible to. In addition, the use of captured images and DSP to detect motion of the cursor control device improves the resolution and sensitivity of the cursor control device. When used as a camera, the apparatus of the present invention saves desktop space while providing a PC user with increased availability and visibility of digital image capture devices, as well as increased number of applications for and usefulness of the digital image capture devices.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A–1D illustrate various views of a cursor control device configured in accordance with one embodiment of the present invention.

FIG. 2A illustrates how the cursor control device configured in accordance with one embodiment of the present invention provides captured images to a PC.

FIG. 2B illustrates how the cursor control device of FIG. 2A utilizes captured images to provide position signals to a PC.

FIG. 3 illustrates a block diagram of a cursor control device configured in accordance with one embodiment of the present invention.

FIG. 4 illustrates an exemplary reference point in an 8×8 grid that can be used in motion estimation by the cursor control device of FIGS. 1A–1D.